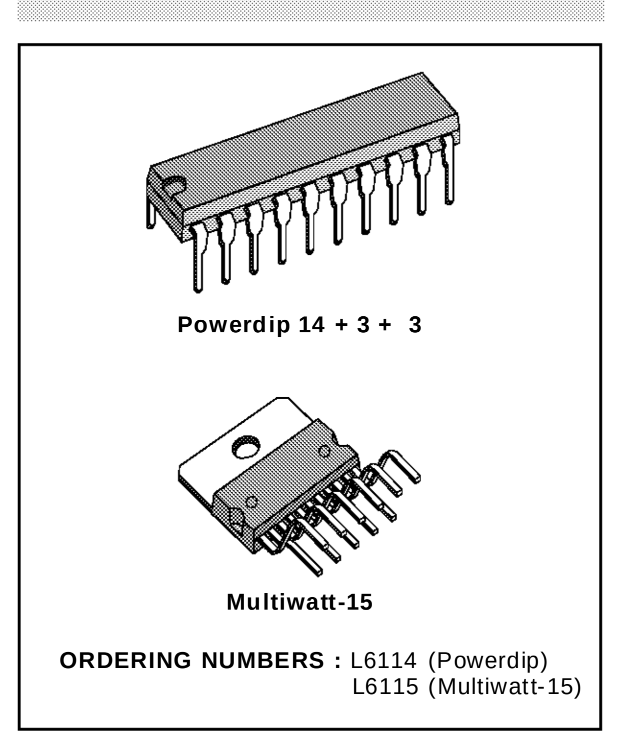


L6114
L6115

QUAD 100 V, DMOS SWITCH

- OUTPUT VOLTAGE TO 100 V
- 0.7 Ω $R_{DS(ON)}$
- SUPPLY VOLTAGE UP TO 60 V
- LOW INPUT CURRENT
- TTL/CMOS COMPATIBLE INPUTS
- HIGH SWITCHING FREQUENCY (200 KHz)

MULTIPOWER BCD TECHNOLOGY



Powerdip 14 + 3 + 3

Multiwatt-15

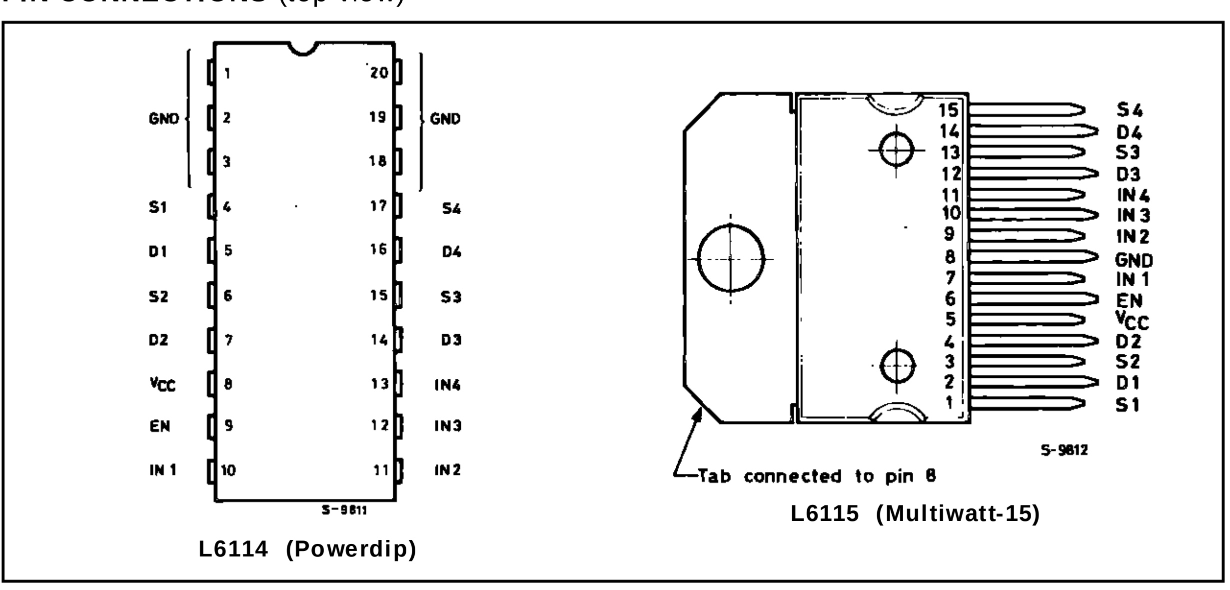
ORDERING NUMBERS : L6114 (Powerdip)
L6115 (Multiwatt-15)

DESCRIPTION

Realized with the Multipower-BCD mixed bipolar/CMOS/DMOS process, the L6114/15 monolithic quad DMOS switch is designed for high current, high voltage switching applications. Each of the four switches is controlled by a logic input and all four are controlled by a common enable input. All inputs are TTL/CMOS compatible for direct connection to logic circuits. Each source is available for the insertion of the sense resistors in current control applications.

Two versions are available : the L6114 mounted in a Powerdip 14+3+3 package and the L6115 in a 15-lead Multiwatt package.

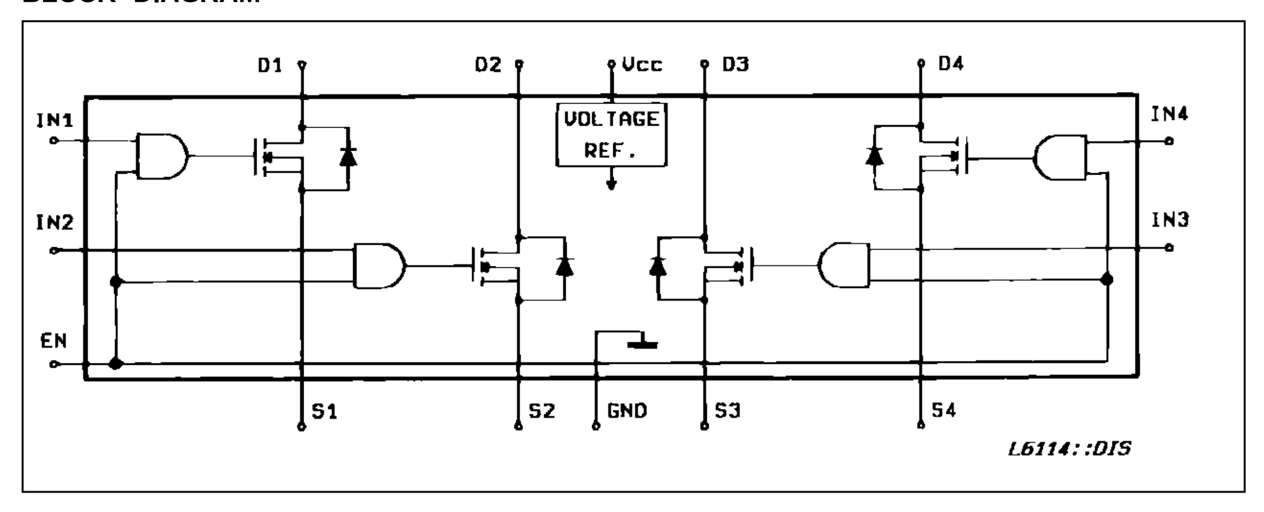
PIN CONNECTIONS (top view)



L6114 (Powerdip)

L6115 (Multiwatt-15)

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
V_{DS}	Drain-source Voltage			100	V
V_{CC}	Supply Voltage			60	V
I_D	Continuous Drain Current	@<0>T_{pins} = 90 °C @<0>T_{case} = 90 °C	Powerdip Multiwatt –15	1.5 3	A A
I_{DM} (*)	Pulsed Drain Current		Powerdip Multiwatt –15	5 8	A A
I_{SD}	Continuous Source-drain Diode Current	@<0>T_{pins} = 90 °C @<0>T_{case} = 90 °C	Powerdip Multiwatt –15	1.5 3	A A
I_{SDM}	Pulsed Source Drain Diode Current		Powerdip Multiwatt –15	5 8	A A
V_{IN}	Input Voltage			7	V
V_{EN}	Enable Voltage			7	V
V_S	Source Voltage			– 1 to + 4	V
P_{tot}	Total Power Dissipation	@ T_{pins} = 90 °C @ T_{case} = 90 °C @ T_{amb} = 70 °C @ T_{amb} = 70 °C	Powerdip Multiwatt –15 Powerdip Multiwatt –15	4.3 20 1.3 2.3	W W W W
T_{stg}, T_j	Storage and Junction Temperature Range			– 40 to + 150	°C

(*) Pulse width ≤ 300 µs, duty cycle ≤ 10 %.
Note : I_D, I_{DM}, I_{SD}, I_{SDM} are given per channel.

THERMAL DATA

Symbol	Parameter		Powerdip	Multiwatt–15	Unit
$R_{th\ j\text{-}pins}$	Thermal Resistance Junction-pins	Max.	14	-	°C/W
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max.	-	3	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max.	65	35	°C/W



ELECTRICAL CHARACTERISTICS (T_j = 25°C, V_{CC} = 40V, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage		14		48	V
I_{CC}	Supply Current	All V_{IN} = H V_{EN} = Square Wave (200kHz, 50 % DC)		9		mA
I_Q	Quiescent Current	V_{EN} = L		2	3	mA
BV_{DSS}	Drain Source Breakdown Voltage	I_D = 1mA, V_{EN} = L	100			V
I_{DSS}	Output Leakage Current	V_{EN} = L V_{DS} = 100V V_{DS} = 80V, T_j = 125°C		 1	 1	mA
$R_{DS\ (on)}$ (*)	Static Drain-source on Resistance	$V_{CC} \geq$ 14V, I_D = 1.5A V_{EN}, V_{IN} = H		0.7		Ω
$V_{IN\ L}$, $V_{EN\ L}$	Input Low Voltage		– 0.3		0.8	V
$V_{IN\ H}$, $V_{EN\ H}$	Input High Voltage		2		7	V
$I_{IN\ L}$, $I_{EN\ L}$	Input Low Current	V_{IN}, V_{EN} = L			– 100	µA
$I_{IN\ H}$, $I_{EN\ H}$	Input High Current	V_{IN}, V_{EN} = H			10	µA
$t_{d\ (on)}$	Turn on Delay Time	I_D = 1.5A See Test Circuit and Waveforms		300		ns
t_r	Rise Time			100		ns
$t_{d\ (off)}$	Turn off Delay Time			400		ns
t_f	Fall Time			100		ns
V_{SD} (*)	Source Drain Diode Forward Voltage	I_{SD} = 1.5A, V_{EN} = L			1.5	V
$V_{SD\ (on)}$ (*)	Source Drain Forward Voltage	I_{SD} = 1.5A - V_{IN}, V_{EN} = H			1.2	V

(*) Pulse test : pulse width = 300 µs, duty cycle = 2 %.

SWITCHING TIMES RESISTIVE LOAD

Figure 1 : Test Circuit
(Pins x = Powerdip ; Pins (x) = Multiwatt).

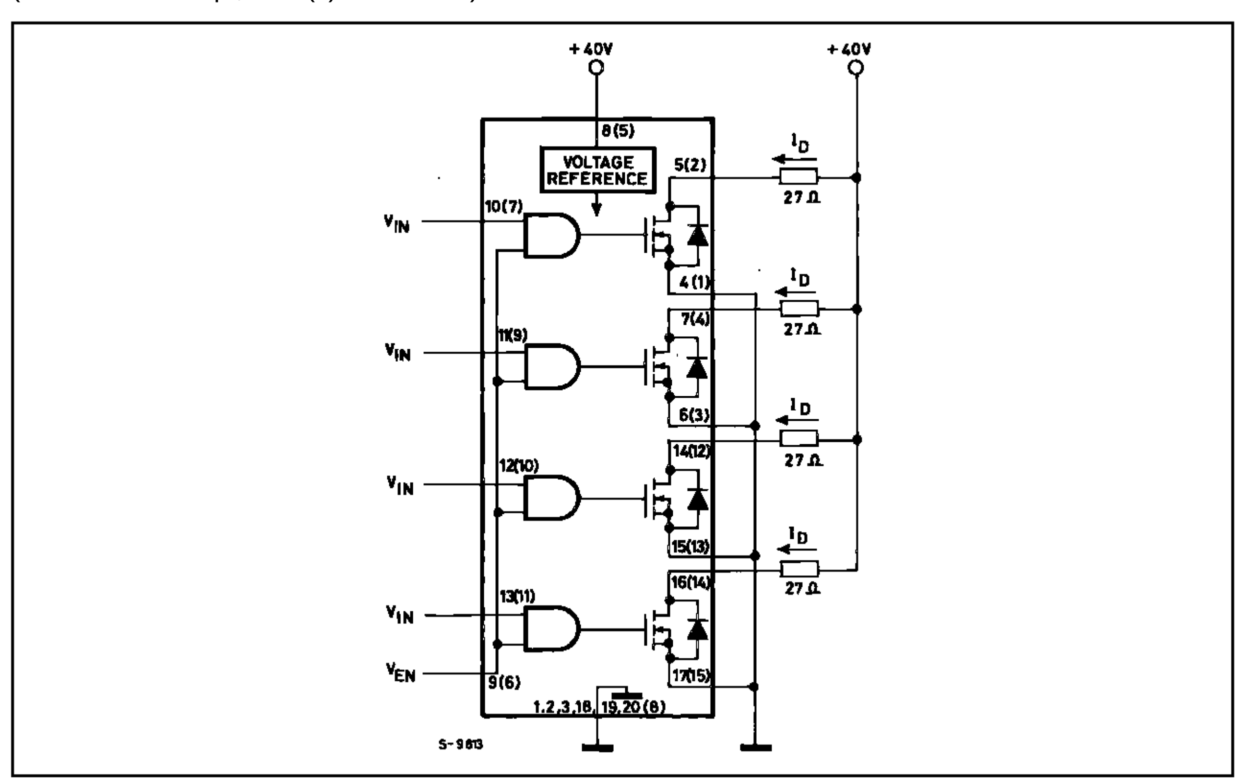
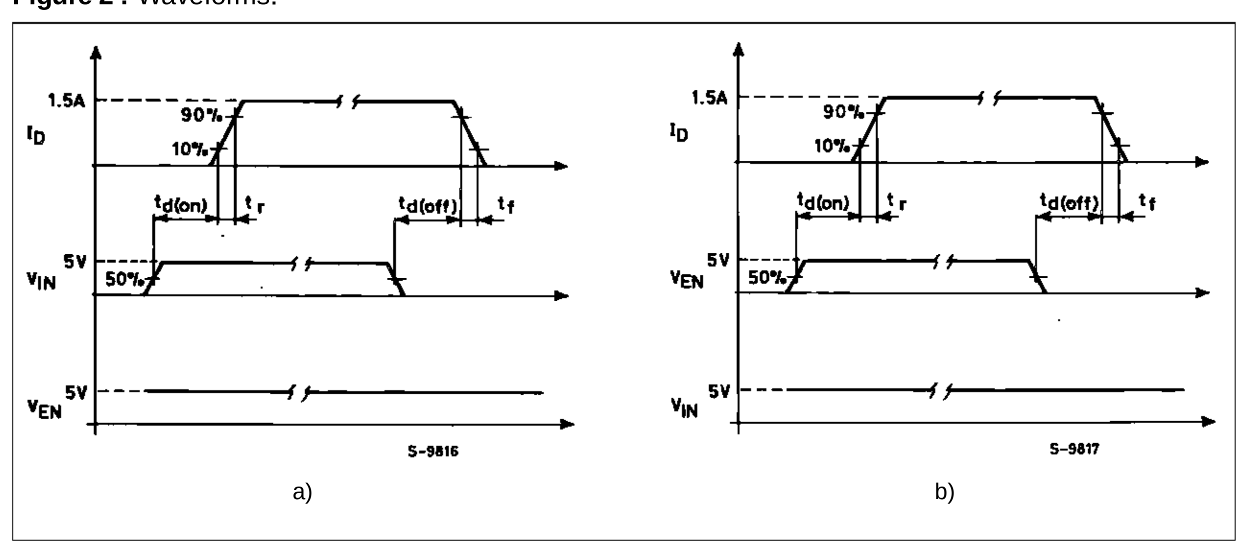
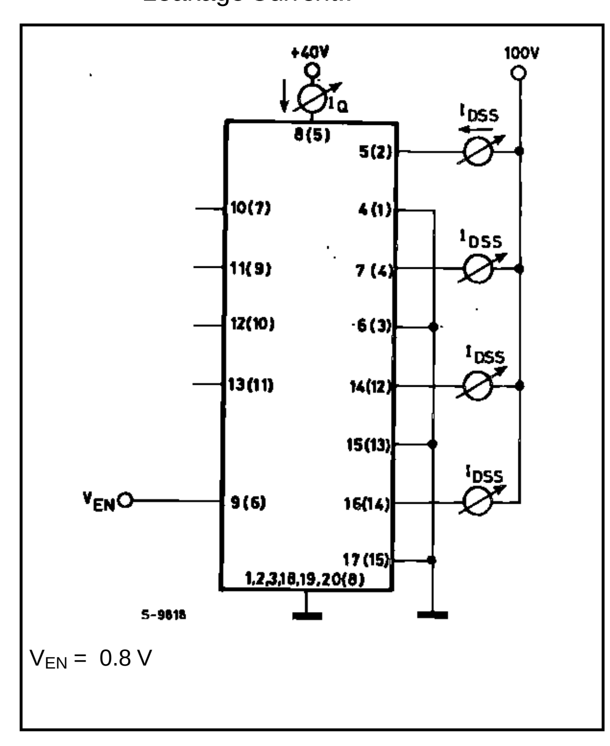


Figure 2 : Waveforms.



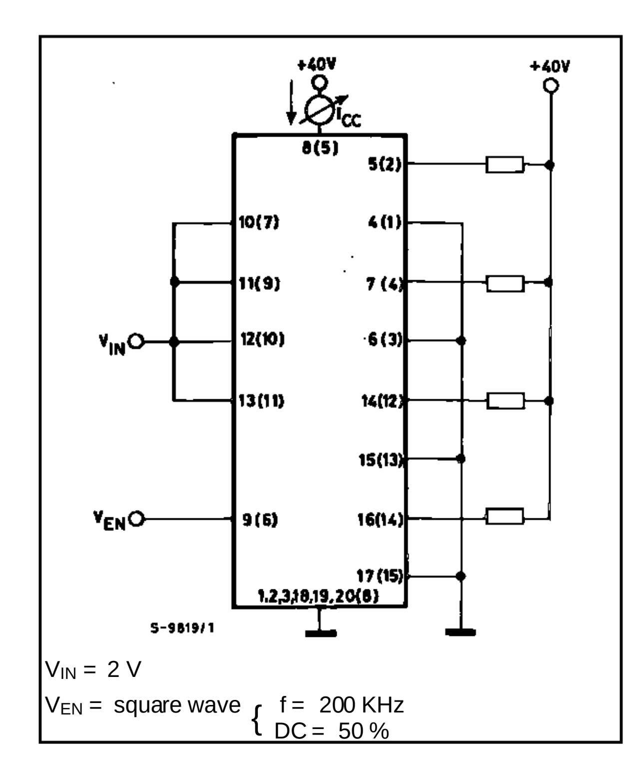
TEST CIRCUIT (Pins x = Powerdip ; Pins (x) = Multiwatt)

Figure 3 : Quiescent Current and Output Leakage Current..



V_{EN} = 0.8 V

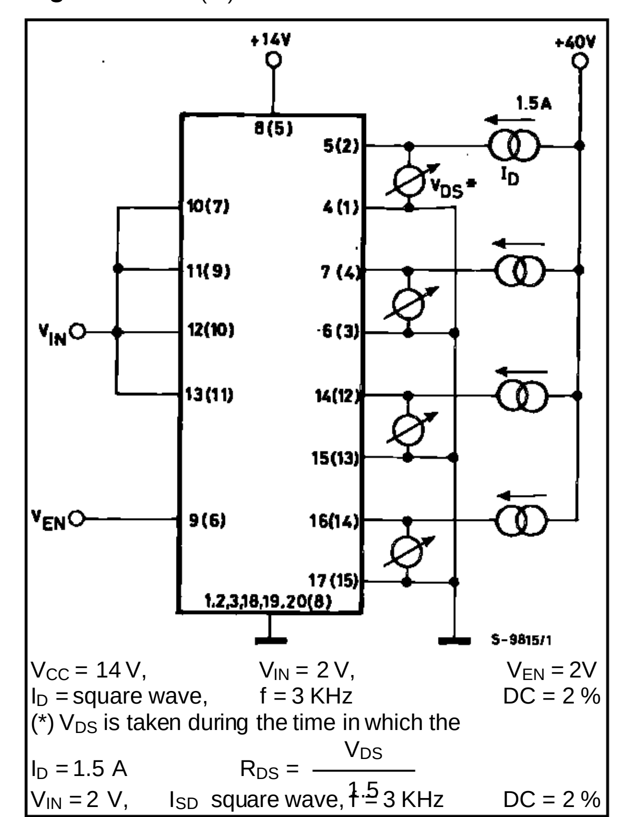
Figure 4 : Supply Current.



V_{IN} = 2 V

V_{EN} = square wave { f = 200 KHz, DC = 50 %

Figure 5 : $R_{DS\ (on)}$.



V_{CC} = 14 V, V_{IN} = 2 V, V_{EN} = 2V

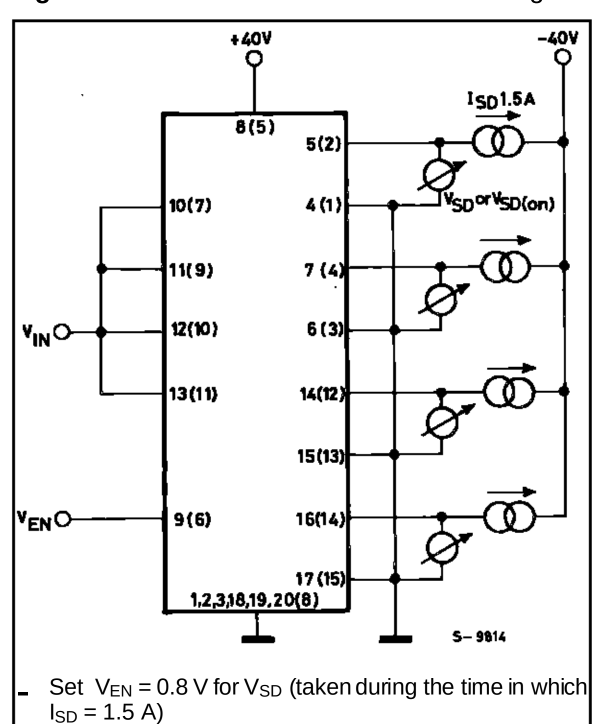
I_D = square wave, f = 3 KHz DC = 2 %

(*) V_{DS} is taken during the time in which the I_D = 1.5 A

$$R_{DS} = \frac{V_{DS}}{1.5}$$

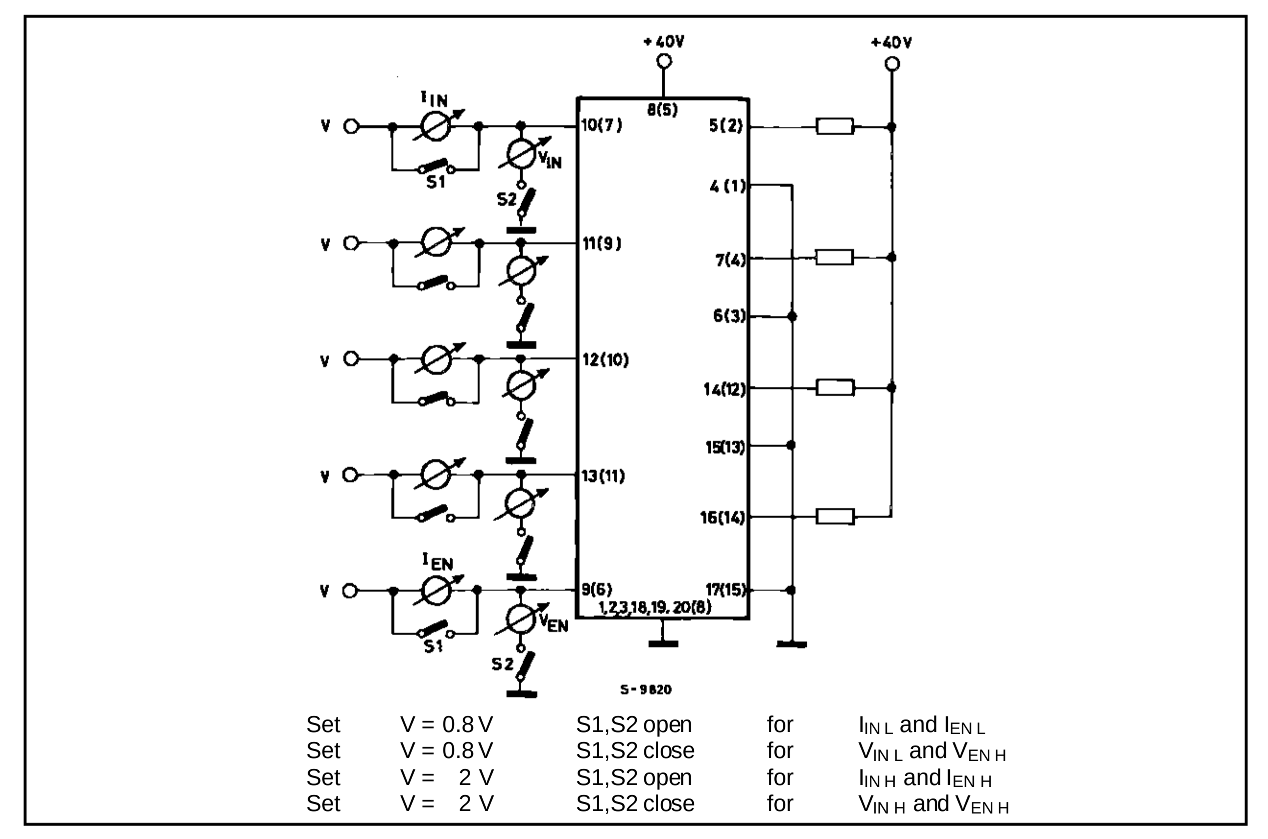
V_{IN} = 2 V, I_{SD} square wave, f = 3 KHz DC = 2 %

Figure 6 : Source-drain Diode Forward Voltage.



- Set V_{EN} = 0.8 V for V_{SD} (taken during the time in which I_{SD} = 1.5 A)
- Set V_{EN} = 2 V for $V_{SD\ (on)}$ (taken during the time in which I_{SD} = 1.5 A)

Figure 7 : Input Logic Levels



Set	V = 0.8 V	S1,S2 open	for	$I_{IN\,L}$ and $I_{EN\,L}$
Set	V = 0.8 V	S1,S2 close	for	$V_{IN\,L}$ and $V_{EN\,H}$
Set	V = 2 V	S1,S2 open	for	$I_{IN\,H}$ and $I_{EN\,H}$
Set	V = 2 V	S1,S2 close	for	$V_{IN\,H}$ and $V_{EN\,H}$

Figure 8 : Static Drain-source on Resistance.

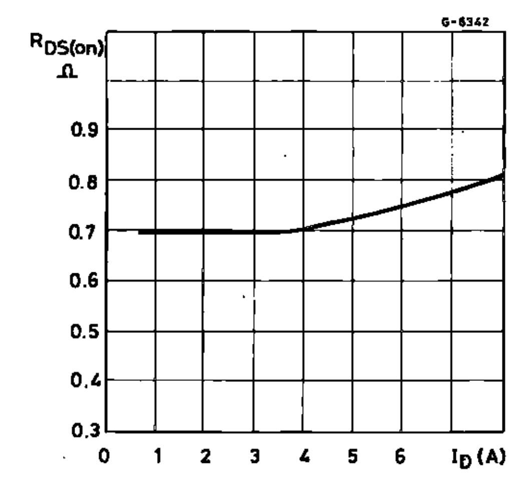


Figure 9 : Normalized Break-down Voltage vs. Temperature.

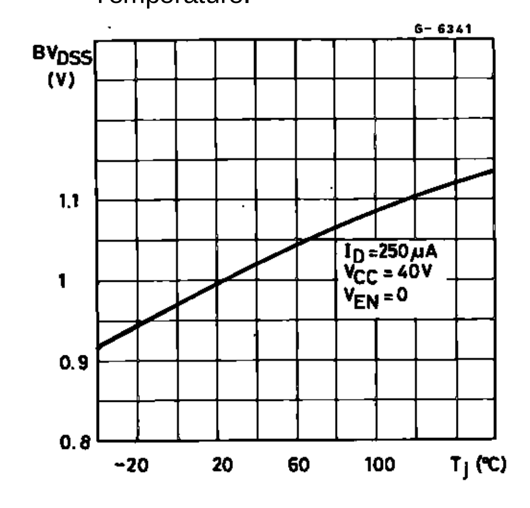


Figure 10 : Normalized on Resistance vs. Temperature.

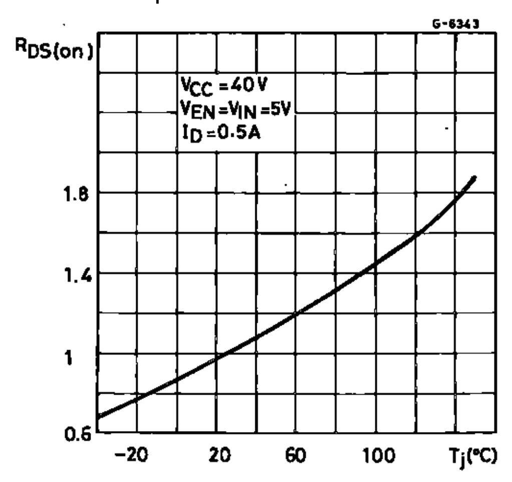


Figure 11 : Typical Source-drain Diode Forward Voltage.

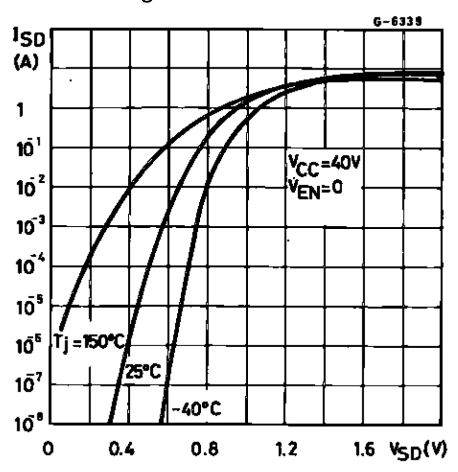
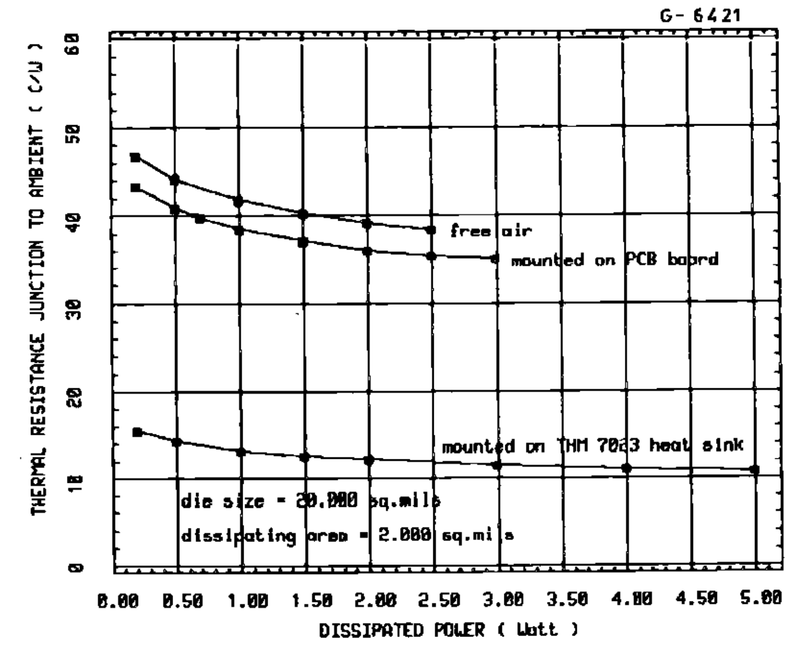


Figure 12 : $R_{th\ j\text{-}amb}$ vs. Dissipated Power(Multiwatt).



(*) $R_{th} \approx 9$ °C/W.



Figure 13 : Transient Thermal Resistance for Single Pulses (Multiwatt).

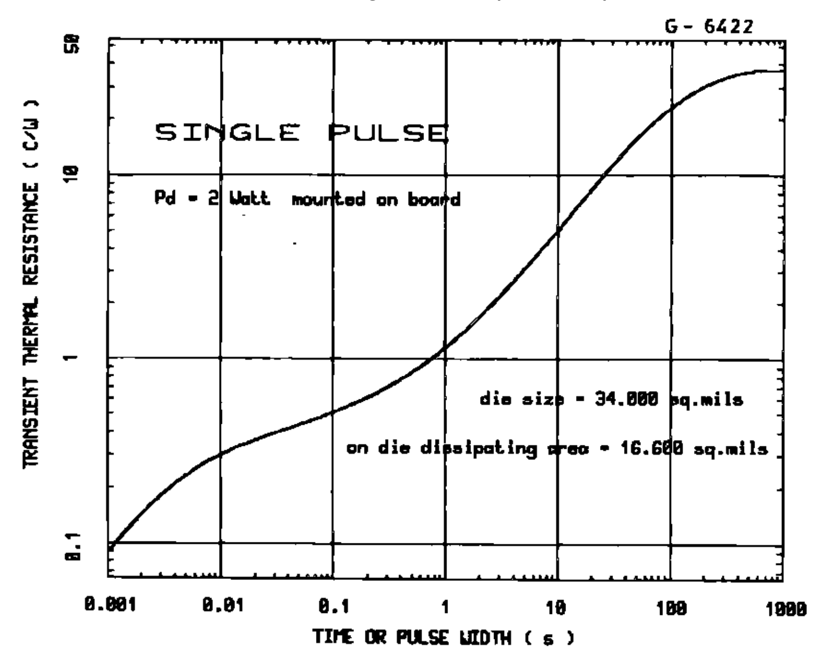
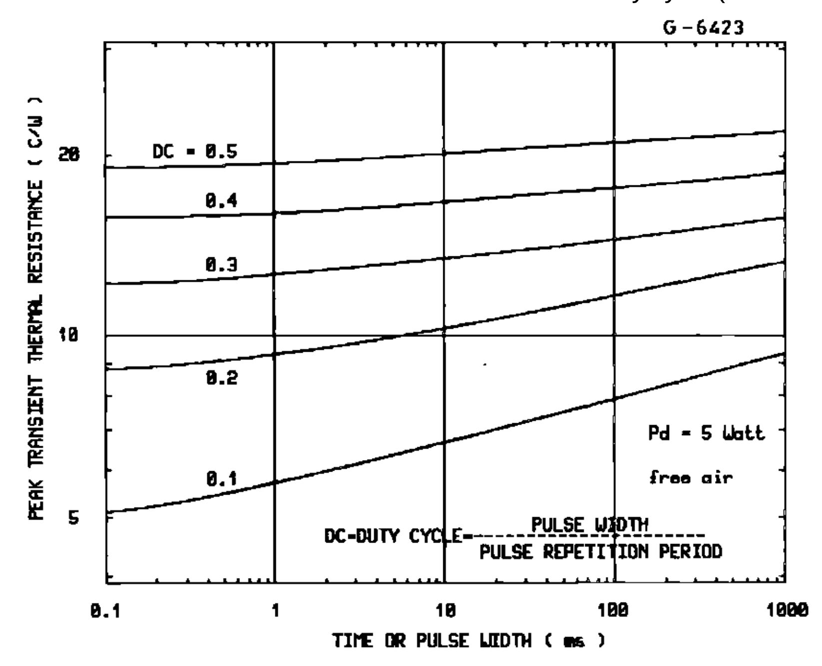
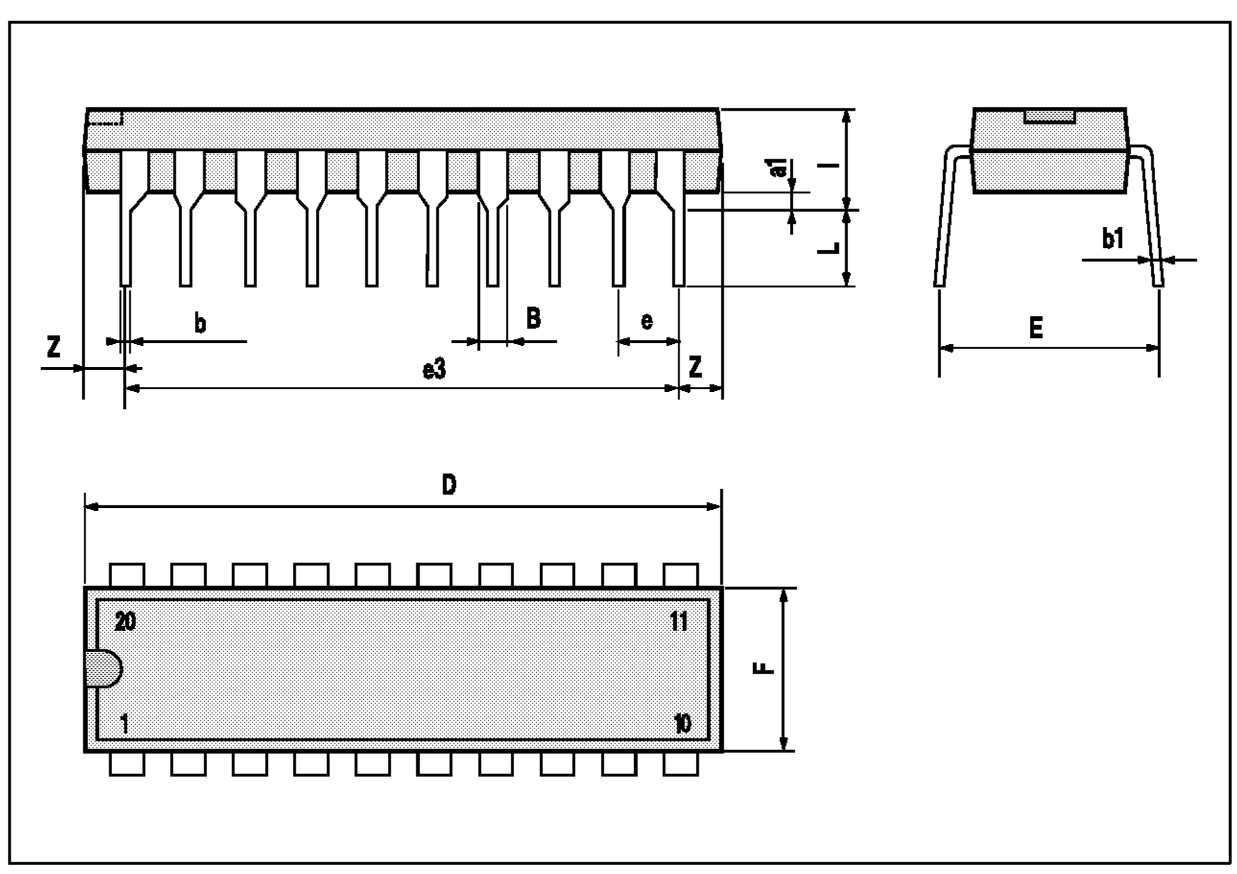


Figure 14 : Peak Transient Thermal Resistance vs.Pulse width and duty cycle (Multiwatt).



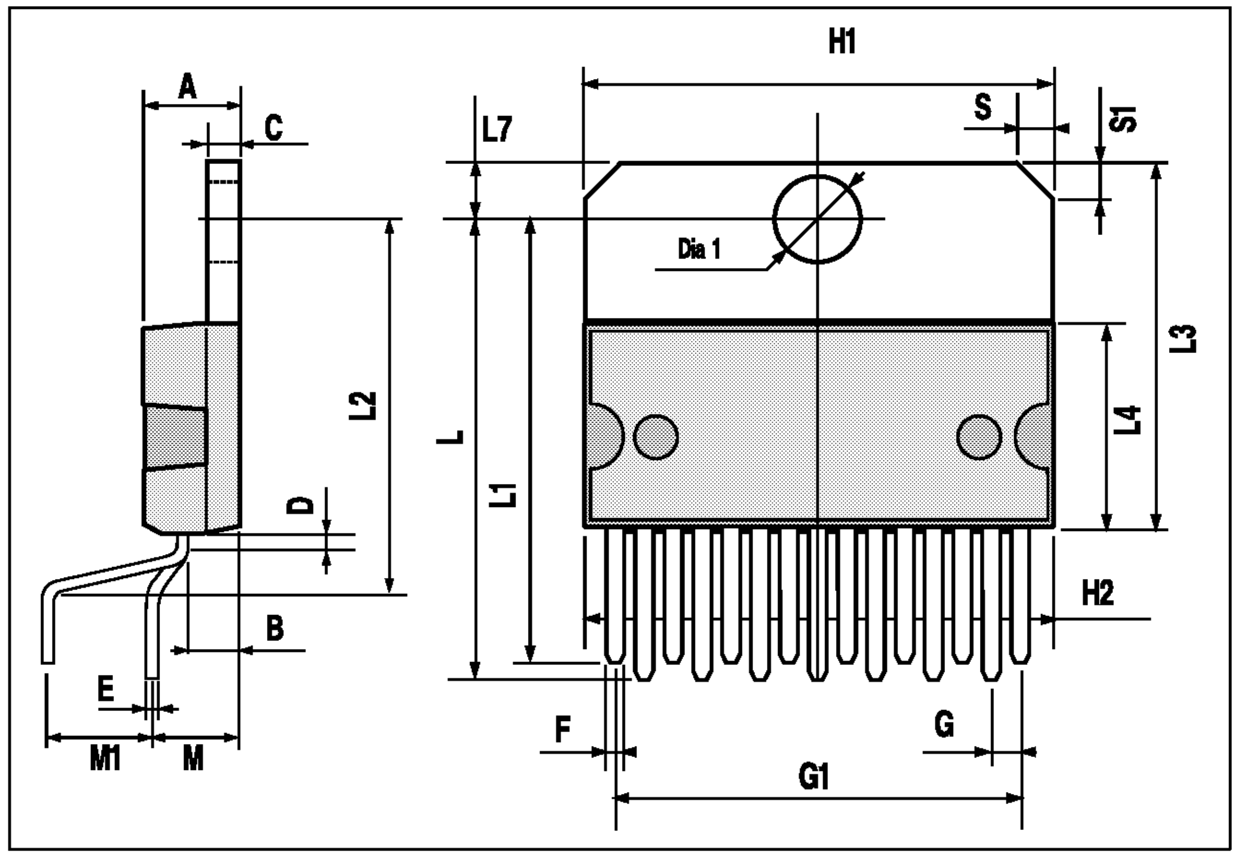
POWERDIP20 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.85		1.40	0.033		0.055
b		0.50			0.020	
b1	0.38		0.50	0.015		0.020
D			24.80			0.976
E		8.80			0.346	
e		2.54			0.100	
e3		22.86			0.900	
F			7.10			0.280
I			5.10			0.201
L		3.30			0.130	
Z			1.27			0.050



MULTIWATT15 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.14	1.27	1.4	0.045	0.050	0.055
G1	17.57	17.78	17.91	0.692	0.700	0.705
H1	19.6			0.772		
H2			20.2			0.795
L	22.1		22.6	0.870		0.890
L1	22		22.5	0.866		0.886
L2	17.65		18.1	0.695		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.2	4.3	4.6	0.165	0.169	0.181
M1	4.5	5.08	5.3	0.177	0.200	0.209
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152




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